

CLAIMS

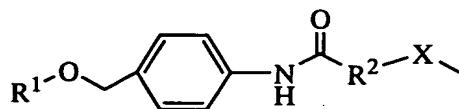
1. A water-soluble polymer compound having sugar  
5 chain(s) comprising a monosaccharide or an oligosaccharide  
residue bound to side chain(s) of a water-soluble polymer through  
a linker containing a selectively cleavable bond, the water-  
soluble polymer containing 20 to 80 mol% of (meth)acrylic acid  
residue, and the linker being bonded to a repeating unit other  
10 than (meth)acrylic acid residue.

2. A compound according to Claim 1, wherein amino acid  
or peptide residues bound to a monosaccharide or an  
oligosaccharide residue are linked to side chain(s) of the water-  
15 soluble polymer through a linker containing a selectively  
cleavable bond, the water-soluble polymer containing 20 to 80  
mol% of (meth)acrylic acid residue, and the linker being bound to  
a repeating unit other than (meth)acrylic acid residue.

20 3. A compound according to Claim 1 or 2, wherein the  
water-soluble polymer is a copolymer comprising 20 to 80 mol% of  
(meth)acrylic acid and 80 to 20 mol% of one or more vinyl  
monomers selected from the group consisting of acrylamide  
derivatives, methacrylamide derivatives, acrylic esters,  
25 methacrylic esters, styrene derivatives and fatty-acid vinyl  
esters.

4. A compound according to any one of Claims 1 to 3,  
wherein the selectively cleavable bond contained in the linker  
30 can be cleaved by hydrogenolysis or by oxidation using 2,3-  
dichloro-5,6-dicyanobenzoquinone.

5. A compound according to any one of Claims 1 to 4,  
wherein the linker is a group represented by General Formula (I),  
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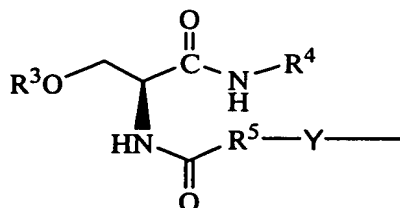
(I)

wherein R<sup>1</sup> is a monosaccharide or an oligosaccharide residue, R<sup>2</sup> is a bivalent linking group with a length equivalent to 4 to 20 methylene groups, and X is O, S, or NH.

6. A compound according to Claim 5, wherein R<sup>1</sup> is an N-acetylglucosamine residue, a glucose residue or a lactose residue.

7. A compound according to Claim 5 or 6, wherein R<sup>2</sup> is a pentylene group.

8. A compound according to any one of Claims 1 to 7, wherein the linker is a group represented by General Formula (II),



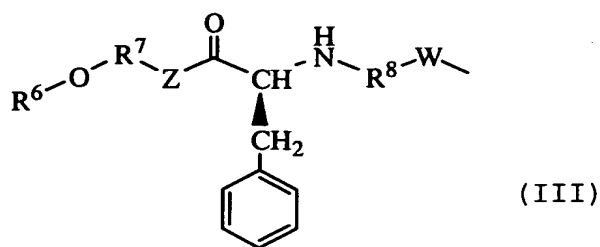
(II)

wherein R<sup>3</sup> is a monosaccharide or an oligosaccharide residue, R<sup>4</sup> is a C<sub>6-20</sub> alkyl or alkenyl group, R<sup>5</sup> is a bivalent linking group with a length equivalent to 5 to 19 methylene groups, and Y is O, S, or NH.

9. A compound according to Claim 8, wherein R<sup>3</sup> is a glucose or lactose residue.

10. A compound according to any one of Claims 1 to 9, wherein the linker is a group represented by General Formula

(III),



5 wherein R<sup>6</sup> is a monosaccharide or an oligosaccharide residue, R<sup>7</sup> is a bivalent linking group with a length equivalent to 2 to 20 methylene groups, R<sup>8</sup> is a bivalent linking group with a length equivalent to 5 to 19 methylene groups, and Z and W are each independently O, S, or NH.

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11. A compound according to Claim 10, wherein R<sup>6</sup> is an N-acetylglucosamine residue.

12. A compound according to Claim 2, wherein the peptide residue consists of 2 to 30 amino acid residues.

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13. A compound according to any one of Claims 1 to 12, wherein the selectively cleavable bond contained in the linker can be cleaved by an appropriate hydrolase.

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14. A compound according to Claim 13, wherein the appropriate hydrolase is ceramide glycanase or α-chymotrypsin.

15. A compound according to Claim 13, wherein the appropriate hydrolase is a protease that does not have a cleavage site in an amino acid or peptide residue to which a monosaccharide or an oligosaccharide residue is bound.

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16. A compound according to Claim 15, wherein the linker containing a selectively cleavable bond that is linked to

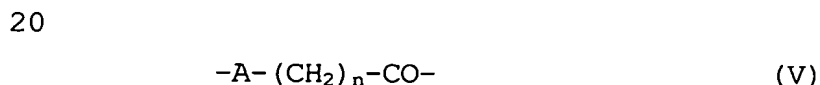
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an amino acid or a peptide residue bound to a monosaccharide or an oligosaccharide residue is a group represented by General Formula (IV),



wherein  $R^9$  is a bivalent linking group with a length equivalent to 1 to 20 methylene groups and is linked to the water-soluble polymer compound, and  $R^{10}$  is an amino acid or a peptide residue  
10 containing a cleavable site by an appropriate protease and is bound to a monosaccharide or an oligosaccharide residue, and that the monosaccharide or oligosaccharide residue is bound to a side chain functional group of Asn, Asp, Cys, Gln, Glu, Lys, Ser, Thr or Tyr residue, or to a side chain functional group of the amino  
15 acid residue in a peptide residue directly or through a bivalent linking group via a glycosidic bond.

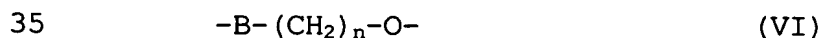
17. A compound according to Claim 16, wherein  $R^9$  is a group represented by General Formula (V),



wherein A is O,  $CH_2$ ,  $C=O$ , or NH, the group is linked to a side chain of the water-soluble polymer through A, and n is an integer  
25 from 1 to 18.

18. A compound according to Claim 16 or 17, wherein the bivalent linking group bound to the side chain functional group is a group with a length equivalent to 1 to 20 methylene groups.

30  
19. A compound according to any one of Claims 16 to 18, wherein the bivalent linking group linked to the side chain functional group is a group represented by General Formula (VI),



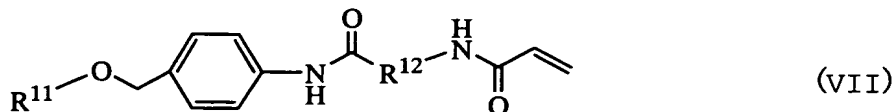
wherein B is O, NH, or C=O, the group is linked to the side chain functional group of an amino acid residue through B, and n is an integer from 1 to 18.

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20. A water-soluble polymer primer for glycoconjugate synthesis comprising a water-soluble polymer compound having sugar chain(s) according to any one of Claims 1 to 19.

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21. A method for producing a water-soluble polymer compound having sugar chain(s) comprising a step of copolymerization of (meth)acrylic acid, a (meth)acrylamide derivative represented by General Formula (VII),



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wherein R<sup>11</sup> is a monosaccharide or an oligosaccharide residue, and R<sup>12</sup> is a bivalent linking group with a length equivalent to 4 to 20 methylene groups, and at least one vinyl monomer in such a manner that the proportion of the (meth)acrylic acid in the total vinyl copolymers is 20 to 80 mol%.

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22. A method according to Claim 21, wherein R<sup>11</sup> is an N-acetylglucosamine residue, a glucose residue, or a lactose residue.

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23. A method according to Claim 21, wherein R<sup>12</sup> is a pentylene group.

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24. A method according to Claim 21, wherein the vinyl monomer is at least one monomer selected from the group consisting of acrylamide derivatives, methacrylamide derivatives,

acrylic esters, methacrylic acid esters, styrene derivatives, and fatty acid vinyl esters.

25. A method for producing a glycoconjugate comprising  
5 the steps of:

(step 1) transferring a sugar residue from a sugar nucleotide to a polymer compound by contacting a water-soluble polymer compound having sugar chain(s) of Claim 1 or 2 with a glycosyltransferase in the presence of a sugar nucleotide,

10 (step 2) elongating the sugar chain by repeating step 1 two or more times if necessary,

(step 3) removing by-product nucleotides or unreacted sugar nucleotides if necessary, and

(step 4) after repeating steps 1 to 3 two or more times,  
15 releasing the resultant glycoconjugate sugar chain from the water-soluble polymer compound which binds the sugar chain elongated by the transfer of the plurality of sugar residues.

26. A method for producing a glycoconjugate comprising  
20 the steps of:

(step 1) transferring a sugar residue from a sugar nucleotide to a water-soluble polymer compound by the action of a glycosyltransferase to the water-soluble polymer compound having sugar chain(s) of Claim 8 in the presence of a sugar nucleotide,

25 (step 2) elongating the sugar chain by repeating step 1 two or more times if necessary,

(step 3) removing by-product nucleotides or unreacted sugar nucleotides if necessary and

(step 4) after repeating steps 1 to 3 two or more times,  
30 transferring the resultant oligosaccharide elongated by transfer of the plurality of sugar residues from the water-soluble polymer compound to ceramide by the action of ceramide glycanase in the presence of ceramide.